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A Few Additions to the Hepatic Flora of the Manual Region.

It goes without saying that we have very little definite information regarding the exact range of any plant, and this is doubly true of any of the lower cryptogams, and especially those in which the interest is purely scientific rather than economic. It is fair to say that we do not know the extent of the geographic distribution of even the most common species of Hepatics. Every new collector in States hitherto unexplored (and there are still States from which not a single hepatic has been picked) extends the known range of one or more species, and it will be years before we shall be able to form a just conception of the distribution of our Hepaticæ.

We note here the addition of a few species to the area of the 6th edition of Gray's Manual. It is more than likely that others still will be found, especially along our northern borders and in the mountain regions.

1. *Lejeunea Austini*, Lindb. Growing at the bases of trees at Kirkville, Onandaga County, N. Y. It belongs to the section *Eu-Lejeunea*, and can be recognized easily by its shining golden green tufts. Its previously known range extended from South Carolina to Louisiana.

2. *Diplophyllum Dicksoni* (Hook.) Dumort, has been sent in from Northern Minnesota (*F. F. Wood*), and from Mt. Desert, Maine (*Rand*); outside our limits it has also been sent from Newfoundland (*Waghorne*). Its previous range in this country included only California, where it was once collected by Bolander.

It verges toward *Jungermannia* § *Sphenolobus*, of which *J. minuta* is a well known representative.

3. *Diplophyllum albicans* (L.) Dumort, has been found at Mt. Desert, Maine (*Rand*). It is found in various parts of British America ranging from Nova Scotia to Vancouver; Mr. Waghorne has also sent it from Newfoundland, where it seems to be quite common. *D. taxifolium* (Wahlenb.) Dumort, given in the Manual as a variety of this species, must be regarded as distinct.*

4. *Mylia anomala* (Hook.) S. F. Gray. Collected sparingly at Mt. Desert, Maine (*Rand*) and more abundantly in Connecticut (*Evans*), whence we shall be able to distribute it in the next issue of *Hepaticæ Americanæ*. It is distinguished from *M. Taylori* by having both acute and obtuse leaves on the same stems, as well as by its general habit.

5. *Kantia arguta* (N. & M.) Lindb. Growing over flowerpots in the greenhouse of Mr. James Ritchie, in Philadelphia, Pa., collected by Mrs. Mary P. Haines and communicated from the Torrey Herbarium; specimens also in the Roy collection are now in my possession. This is evidently an introduced plant brought from Europe, like *Lunularia vulgaris*, and growing in similar situations.

6. *Fossombronia cristata*, Lindb. Growing on clay banks at Fern, Putnam County, Indiana, November, 1891; what appears to be the same thing was collected at Readville, Perry County, Ohio, October, 1891 (*Werner*). These are undoubtedly the forms that were confused by Sullivant and others with *F. pusilla;* we have not seen fertile specimens of the last named species from this country, and it is useless to attempt to name sterile specimens of this genus.

7. *Metzgeria furcata* (L.) Dumort. In reviewing a large series of specimens of *Metzgeria*, nearly all of which are sterile, we find several which have the thallus characters of *M. furcata*, which in the sterile state is too close to *M. conjugata* to be agree-

*Besides the three species mentioned above, we have two additional ones from N. W. America; *D. obtusifolium* (Hook.) Dumort, and *D. argentea* (Tayl.) Spruce.

able.* The stations for *M. furcata* are North Conway, New Hampshire (*James*); Lancaster County, Pennsylvania (*Porter*); Delaware Water Gap (*James*), North Carolina (*Ravenel*). *M. conjugata* has a much wider distribution.

In addition to the above the following corrections may be made:

P. 705, *Frullania Pennsylvanica*, Steph., should be stricken from the list, having been founded on some form of *Jubula Hutchinsiæ*, as we learn from Dr. Stephani himself.

P. 718. *Harpanthus Flotovianus* has been found by Mr. Waghorne in Labrador, as noted in the September number of the BULLETIN, and will doubtless be found in Northern New England. The words "certainly extralimital" were never our thought, and were added to the MS. after it left our hands.

P. 719. Var. *attenuata* will stand as a species and should read, *Jungermannia attenuata*, Lindenb.

LUCIEN M. UNDERWOOD.

Greencastle, Indiana, 27th July, 1892.

Interesting Oaks Recently Discovered on Staten Island.

By WILLIAM T. DAVIS.

I.—A number of black scrub oaks, *Quercus ilicifolia*, occupy the sandy ground at Watchogue on Staten Island, and associated with them, particularly in the dryer situations, are many Black Jack oaks, *Quercus nigra*. These trees are easily separated, and at Watchogue there are many hundred of each kind whose spe-

*Our species in the sterile state may be recognized as follows:

Thallus pubescent on both sides; costa covered on antical side by more than two rows of cells, *M. pubescens*.

Thallus pubescent on postical side and at margins; costa covered on antical side by two rows of cells.

Costa covered on postical side by two rows of cells; marginal hairs long, curved or hooked, *M. hamata*.

Costa covered on postical side by three to six rows of cells.

Thallus decurved; marginal hairs in 2's or 3's, divergent.

Thallus very narrow; costa large; hairs very abundant on costa and margins; (dioicous), *M. myriopoda*.

Thallus broader; costa small; marginal hairs always twinned; (autoicous), *M, conjugata*.

Thallus plane; marginal hairs not protruding; lamina usually with scattered hairs; (dioicous), *M. furcata*.

cific distinctions are obvious. There are also, in addition, a number of trees whose place is not so evident, and it becomes a question when viewing them as to whether they exhibit more of the characters of *ilicifolia* or *nigra*. They form, when taken together, a series leading from one species to the other, and apparently are hybrids resulting from the cross fertilization of the two.

Though these trees vary considerably, individually they resemble *Quercus nigra* in being erect and rigid in growth, in their short, abruptly tapering branches, and in having the leaves rusty-pubescent beneath. They resemble *Quercus ilicifolia* in being small, in their smooth, light-colored bark, and in the retention of their dried catkins in abundance throughout the summer.

Occasionally a *Q. nigra* will retain its dried catkins in place late into the year, but with *Q. ilicifolia* it is a very usual feature.

One of the trees that bears the greatest resemblance to *Q. nigra* is erect in growth, about eight feet high, and the leaves vary in shape from the *nigra* form to that of *ilicifolia*. They are more rusty-pubescent beneath than *nigra*, and the tree has a lighter appearance, owing principally to the color of its bark. Only two or three partly broken cups of last year's acorns remained on its branches, for it bore no fruit this year, but it retained its dried catkins in abundance.

Another tree, that is about six feet tall and has the under surface of the leaves rusty-pubescent, bore two abortive acorns this year, but retained its catkins. Still another tree near by, is erect, about six feet tall, and has the leaves whiter beneath than the last. It bore no acorns, but, like the other trees, retained its catkins. None of the remaining trees so far discovered, the tallest of which is fourteen feet high, bore any fruit at all this year.

At the other end of the island, at Rossville and Tottenville, *Quercus nigra* grows abundantly, but *Quercus ilicifolia* is absent, and a diligent search at these places resulted in the discovery of no such trees as those to be found at Watchogue.

The last edition of Gray's Manual contains a list of hybrid oaks, from which it appears that *Quercus nigra* gives rise, as one of the parents, to two forms. Thus it is known to cross with the

Shingle and the Willow oaks, producing thereby varieties that are recognizable and have in consequence been named. *Quercus ilicifolia* is likewise known to be one of the parents of a hybrid form. The cross between *nigra* and *ilicifolia*, however, is not mentioned, and as it is also a recognizable form I wish to propose for it the name of *Quercus Brittoni*, after Dr. N. L. Britton, who was born on the island, and who, with Mr. Arthur Hollick, has done so much in making known its flora.

II.—A single oak of much interest stands in a thick growth of trees in moist ground not far from the specimens of *Quercus Brittoni* mentioned above. It is sixteen inches in circumference several feet from its base, and once stood about twenty-five feet high, as proved by measurement, though in consequence of a decayed base the trunk is now partly prostrate. A considerable portion of the tree is still clothed in leaves, which are white-downy beneath, and it produces acorns, but neither the fruit nor the foliage is distinguishable from that usually borne by the diminutive *ilicifolia*, which commonly has a trunk no larger round than one of the branches borne by this tree.

Wood says of *Quercus ilicifolia*: "a shrub" three to four feet high; Eaton and Wright give two to eight feet, and Loudon, in his Encyclopædia of Trees and Shrubs, says: "This very remarkable little tree is generally found about three or four feet high; but in favorable situations it is sometimes found to reach the height of eight or ten feet." Lastly, in the recent edition of Gray's Manual it is mentioned as dwarf and straggling, and eight is given as the maximum height.

It will be seen from these facts that this tree has attained over twice the size heretofore accorded the species, which certainly makes it interesting and noteworthy.

Buchloe dactyloides, Englm., not a Diœcious Grass.

The common buffalo grass of the "plains" is well known to botanists. It begins to appear near the ninety-fourth meridian, and extends westward to the Rocky Mountains, northward into the British possessions, and southward to the sands of the Gulf coast. It is a grass of short stature, seldom more than six inches tall, though I have specimens collected in this State more

than a foot high. Our species was formerly of great repute among stockmen in the central and northern parts of its range as a winter forage plant. Much of the credit given to it belongs, however, to species of *Bouteloua*, especially to *B. hirsuta* and *B. oligostachya*. It usually neighbors closely with those grasses, which are regarded by many ranchmen as merely forms of it. While doubtless a very nutritious grass, its manner of life adds very much to its value. It has a way of sending its roots down ten or fifteen feet, which, combined with its stoloniferous character and its numerous curling linear leaves, enables the plant to live and thrive under most unfavorable climatic conditions. Naturally almost hay, it readily cures under the dry, hot winds into a valuable fodder for the wild deer and the wild buffalo, as well as for their successors, the hardly less wild steers of the cattlemen. Farther east and south, it largely yields place to more luxuriant grasses.

The history of our subject is interesting from the fact that, for a long time after its discovery, what has hitherto been regarded as its true character, was unknown to botanists. Nearly seventy five years ago, Nuttall discovered the staminate form and named it *Sesleria dactyloides*. In 1855 Steudel named the pistillate form, collected by Drummond, *Antephora axilliflora*—no botanists at that time recognizing the relationship of the two forms. In 1859 the late Dr. George Engelmann, of precious memory to botanists, received what he considered a mere sprout of the plant, a form bearing both staminate and pistillate flowers, but borne on distinct stalks proceeding from different parts of the same rootstock. The practiced eye and judgment of Dr. Engelmann saw at once that *Sesleria dactyloides* and *Antephora axilliflora* were forms of the same plant. Supposing that he had before him a dicœcious grass so distinct from all others as to possess generic characters, he founded a new genus and named it *Buchloe*, a contraction of Bubalo, Greek for the Old World buffalo, and chloa, grass.

Great and important facts and principles in science and philosophy often lie around loosely, and cuffed and are kicked about for years, sometimes for centuries, because great men, strongly intent upon another and more remote object, overlook that which

is near by and under foot. The sheep-like world follows the leader until a chance observation reveals the proximate fact, and then every one wonders why every one had not seen it before. From my first introduction to buffalo, about twelve years ago, and without personal knowledge of the plant in its original monœcious form, but knowing that such a form existed, I was led to doubt the correctness of Dr. Engelmann's conclusion that it is really a diœcious grass. The presumption of doubt strengthened when I found an individual plant bearing both staminate and pistillate flowers. Further experience confirmed my strong notion into what may be considered to be a fact.

During one of my botanical rambles in Kansas, while walking over soil newly moved by a freshet, I noticed the peculiar appearance of the individual plants of buffalo grass growing upon it. There were scores of them, if not hundreds. All of them appeared to be seedlings, having yet not sent out stolons. All of these plants were monœcious. That seems to be sexually the original character of the species. The fact of the unisexual flowering stems, proceeding from different parts of the plants, with its stoloniferous character generally increasing and spreading in that way, will fully account for its diœcious habit.

The facts of the rapid disappearance of the species with the advent of civilization and agriculture, the paucity of pistillate plants, and that the pistillate form, like the staminate one, is seldom, if ever, found growing singly, can now be easily explained. The staminate stolons are much stronger than the pistillate ones, so that they easily outgrow and overrun the others, becoming sometimes two to five or more feet long. There are probably a thousand individuals of the staminate form to one of the pistillate. The few large seeds are eagerly sought by animals. They are often, too, destroyed by a beetle. Seed-bearing individuals being thus easily destroyed, few seeds remain for reproduction, and much of that which remains only aids in giving the stronger form more chance in the race of life. So when either form is destroyed its destruction is complete.

If carefully conducted experiments in growing plants of buffalo grass from its seed should show that the plants before they send out stolons are always, or generally, diœcious, which cannot

be, as these are too monœcious plants, then Dr. Engelmann's theory of the sexual character may be correct. In the absence of such proof, if we are true philosophers, we are obliged to accept the nearest-by theory that explains the phenomena that the life, character and life-work of our plant presents; and pronounce it to be originally, as it comes from the seed, a monœcious grass, bearing unisexual flowers upon stalks arising from different parts increasing itself mainly by stolons proceeding from sexually different parts of the plant, each reproducing its own form.

E. N. PLANK.

BRENHAM, TEXAS.

The Rhizomes of Penthorum sedoides as Leafy Shoots.

In August, 1891, a *Penthorum sedoides*, L., was taken from the wet sand of a ditch and placed in a glass jar of water in which aquatic plants and animals were kept for study. About three months afterwards it was taken out of the jar to be thrown away, since the leaves had fallen off and the stem was mostly dead, and it was thought to be of no further use. Finding the subterranean stems, which were three or four in number and from two to three inches long, thickly covered with leaves, the plant was replaced in the jar for further development; the shoots had not attracted attention before, as they were in the midst of stems of *Anacharis*, which they resembled closely enough to be overlooked. At the beginning of the past summer most of these leaves had dropped off, but one stem had a living bud and some fresh leaves after more than a year's time had passed. The rhizomes have behaved like an aquatic, floating in the water in which they have been immersed, and receiving plenty of light but no food except what has been furnished by the stem and the water. The leaves are of a deep green color, and are closely imbricated, they are sessile, narrowly oblong-oblanceolate, acute, and finely serrate. They are from three to five eighths of an inch long, thickish, or inclined to be fleshy. A minute bud is found in the axile of each; they are very much crowded, and are apparently eight-ranked. They call to mind species of *Sedum*, especially *S. acre*, by the imbricated leaves, their small size and general ap-

pearance, though not so fleshy. Under the conditions to which it has been subjected, the plant assumes the look of one belonging to another genus of the same family, but of a different habit, since the stone-crops are frequenters of rocks and dry places. This may show a common origin in which the ancestor of *Penthorum* resembled *Sedum* more closely than at present.

The behavior of these subterranean stems in water may also throw some light on the true place of *Penthorum* in the natural system, since it has been a matter of dispute. *Penthorum* and *Diamorpha* forming the group Diamorpheæ, and usually included with Crassulaceæ, are placed by some with the Saxifragaceæ. La Maout and Decaisne metion them in this connection, plainly regarding them as more closely allied to the latter than to Crassulaceæ, "whose relationship they evidently reject by their several-celled ovary." Schönland, who prepared the article "Crassulaceæ" for Engler and Prantl's Pflanzenfamilien, makes a group of *Penthorum*, *Diamorpha* and *Triactina*, and places them in his arrangement nearest to Saxifragaceæ. They are thought to be more nearly related to *Sedum* than to other genera of the order, or pointing to *Sedum* for their parentage. The small, crowded and somewhat thickened leaves borne by these spreading subterranean shoots, or stolons, of *Penthorum*, (since they also start from the stem above ground and form true stolons), make this relationship still more apparent, and help to remove one objection to placing it with the Crassulaceæ. Schönland writes as follows with regard to this relationship: "The Crassulaceæ constitute a very natural group of forms. The only genus that has been separated from them by recent authors is *Penthorum*, which Baillon has placed with the Saxifragaceæ. Its possession of membranaceous and not fleshy leaves cannot be alleged as the sole ground for this, since many species of *Crassula*, *Vialanchoe*, etc., also have quite thin, but slightly thickened leaves. Hence it may be recommended to leave *Penthorum* here" (with the Crassulaceæ.)*

E. J. HILL.

ENGLEWOOD, CHICAGO, ILL., Sept. 6, 1892.

*Die Natürlichen Pflanzenfamilien, III Teil, 2 Abt. a., p. 28.

Variation in the Leaves of Clematis Reticulata and Other Notes.

By Charles Mohr.

(Plate CXXXIII).

In Southern Alabama and on the eastern border of Central Mississippi, specimens of a *Clematis* have been collected, which in form and size of their leaves presented a habit so widely differing from the forms of *Clematis reticulata*, known to me at the time, from Florida and Texas, that I could not convince myself of the identity of the plants from the eastern Gulf region with that species. After having had, by the kindness of Dr. Geo. Vasey, opportunity for comparing them with the series of forms in the National Herbarium from the Southern Atlantic States and from Texas, all doubts on this point were dispelled. The variation in the size of the pinnate leaves, in the number of pinnæ, the size and shape of their leaflets exhibited by these plants from different localities, is very remarkable and of interest by their manifest connection with their geographical distribution.

The specimens from South Carolina and Georgia exhibit the most meager foliage, the leaves of a few pinnæ with the leaflets lanceolate to ovate-lanceolate and acute (Fig. 1 and 2). In the plants from Eastern Florida, the leaflets became more expanded, ovate forms and prevailing considerably longer than wide, more or less blunt with the tendency to palmate or digitate division, (Fig. 3 and 4), the simple leaves supporting the flower stalk remaining lanceolate and acute (Fig. 5). The plants from the eastern Gulf region show the greatest luxuriance in their foliage, the large leaves with from three to four and more pinnæ, bearing roundish to broadly ovate leaflets, but little longer than wide, blunt or emarginate and often slightly cordate at the base (Fig. 6and 7), the opposite simple leaves subtending the pedicels, ovate and obtuse (Fig. 8 and 9). The specimens from Eastern Texas present a foliage somewhat intermediate between the latter and the Florida plants (Fig. 11 to 12).

These variations in the leaf form are easily explained when the difference in the moisture conditions are considered, prevailing in distant localities during the period of most active growth. Sparsely-leaved forms, with more narrow and acute leaflets, to all appearances predominate in the Southern Atlantic region, with a

rainfall averaging ten inches during the spring, and fifteen inches during the summer months.

In Alabama and Eastern Mississippi, with a precipitation on the average of fifteen and of twenty inches respectively during the same seasons, the foliage is rich and abundant with large, rounded leaflets, whereas the Texan specimens, from a region with a precipitation similar to that of Florida, during the same periods, approach in their foliage the plants from that section.

In view of these facts, the position I have taken in my remarks made before the Botanical Club of the American Association for the Advancement of Science, at the Washington meeting in 1891, in regard to the specific character of the specimens of *Clematis* from the Eastern Gulf States has to be abandoned.

As worthy of record I would allude to the occurrence of *Quercus heterophylla* in Alabama. This tree, unknown to me, was pointed out by my companion, Mr. Sudworth, in our explorations of the forests of the southern banks of the Tennessee River in Morgan County. In all its characters, the tree presented not the slightest deviation from the forms found on the Atlantic slope. From the abundance of cups scattered below the tree, it is evident that it fruits freely and, as in other localities cited, it is found associated with *Quercus Phellos* and *Q. rubra*. This association, however, cannot be taken as a proof of its being a hybrid; the constancy of its characters under varying conditions of soil and climate, and its fecundity are the strongest proof of its specific value.

Mr. Sudworth has found this tree near Ann Arbor, Michigan, extending thus its geographical range to over about eight degrees of latitude, and spreading from the coast far into the interior.

The Rediscovery of Juncus Cooperi.

In the year 1868 Dr. George Engelmann published a description of a new *Juncus* from the southwestern United States, giving it the name *J. Cooperi*.* A single specimen without rootstock or leaves had been collected by Dr. J. G. Cooper in 1861, in the vicinity of Camp Cady, a now abandoned military post situated

*Trans. St. Louis Acad. Sci. ii. 590 (1868.)

about fifteen miles east of Daggett, San Bernardino County, California. Upon this one specimen all knowledge of the species has rested for thirty years.

The Death Valley Expedition sent out by the U. S. Department of Agriculture entered Death Valley in January, 1891, and camped for several days at Bennett Wells. On the evening of our arrival I walked eastward from camp a few hundred yards to the margin of the salt marsh in the bottom of the valley, and there, amidst the other vegetation peculiar to the densely alkaline moist soil about the salt flat, I found in fruit a *Juncus* evidently related to, but clearly distinct from, both *J. Rœmerianus* and *J. acutus sphærocarpus*. A subsequent examination showed it to be the long lost *J. Cooperi*. It was subsequently found to occur in several places in Death Valley, about the old Eagle Borax Works, on the east side of the valley opposite Bennett Wells, about four miles south of Furnace Creek ranch, near the Coleman Borax Works, two miles east of the same ranch in Furnace Creek Cañon, and at Saratoga Springs. Eastward from Death Valley it was found at several places in Resting Springs Valley, California, and at Ash Meadows, Nevada, points in the watershed of the Amargosa River, and in the Vegas Wash, Nevada, about eight miles from the great bend of the Colorado River. West of Death Valley it was seen only at Hot Springs, Panamint Valley.

At all its stations the plant grows in soil like that described above, and in tufts sometimes composed of only a few stems or occasionally attaining the extraordinary diameter of 2 meters. Upon the new material collected, the following description is based:

Juncus Cooperi, Engelm. Trans. St. Louis Acad. ii. 590 (1868). Plant perennial, densely tufted, 60 to 80 cm. high. Roots large, unbranched and 2 to 3 mm. thick near the base, composed of a slender vascular central thread surrounded by soft parenchyma tissue and an epidermis; rootstocks short, closely branched; stems erect, rigid, terete or slightly compressed, striate, leafless between the inflorescence and the base; lower sheaths light brown, shining, bladeless, but with a filiform-aristate appendage about 10 mm. long; upper 1 to 4 sheaths stramineous to light green, bearing a stiffly erect spine-pointed terete leaf exactly resembling the stem; inflorescence paniculate, its lower leaves erect, exceeding the panicle, about 10 cm. or less in length, otherwise like the root-leaves; branches of the panicle erect or nearly so, 8 cm.

long or much shorter, mostly unbranched, terminated by a 4-to 10-flowered glomerule; flowers borne singly in the axils of white scarious cuspidate bracts, the very short pedicel similarly bibracteate; sepals 5 to 6 mm. long, oblong-lanceolate, cuspidate, coriaceous, shining, plainly but not prominently few-nerved, scarious-margined; inner sepals shorter, barely cuspidate; stamens 6, nearly equalling the inner sepals, anthers when moist about 2.5 mm. long by 1 mm. wide; ovary oblong, equalling the included style; stigmas 2 to 2.5 mm. long; capsule narrowly oblong, acute, 3-sided, exceeding the sepals by 1 mm. or less, rigid-coriaceous, 3-celled, valves spreading but slightly in dehiscence; seeds closely packed and misshapen, with a conspicuous raphe and short tails, body about 1 mm. long, oblong, reticulate, the areas themselves smooth or faintly reticulate, not lineolate.

This rush is most nearly related to Engelmann's *Juncus acutus sphærocarpus* (*J. robustus*, Wats.) and, less closely, to *J. Rœmerianus*. It agrees with both in its stiff, erect, stem-like, pointed leaves, pseudo-lateral inflorescence, and glomerate flowers; and differs from both in its simpler inflorescence and much larger flowers and fruit, from the former in its cuspidate sepals and narrower capsule, and from the latter in its rigid coriaceous sepals.

Since making the observations on the Death Valley specimens, I have found in the National Herbarium, under the name *J. compressus*, a specimen of *J. Cooperi*, collected by C. R. Orcutt, in 1868, at Borrego Springs, Colorado Desert, California. It is probable, therefore, that the species will be found more widely distributed in the deserts of southeastern California. Mr. S. B. Parish informs me that he has looked carefully for the plant at Camp Cady, its type locality, but has failed to find it. Dr. Cooper undoubtedly found the plant farther out in the desert than has been supposed, in some alkaline marsh.

FREDERICK VERNON COVILLE.

Botanical Notes.

Aster undulatus, L. One of the ligulate florets from a plant of this species was found to have three well-developed style-branches. The branches were all alike and also like the style-branches of other ligulate florets. The stigmatic papillæ were along their margins [as shown in I. 2 is the normal style of the ligulate floret and its branches].

Mikania scandens L. A floret of this plant was found which had two of its filaments united. All the anthers were slightly united and were not essentially different in shape or size from other specimens examined. The filament in this species is made up of two distinct parts. There is a joint in the filament about .25 mm. below the base of the anther. Above this joint the tissue is made up of cubical cells. Their walls are comparatively thick and the tissue which they form is transparent. In the rest of the filament the cells are elongated, and the tissue they form is not transparent. The union of the filaments, in the case under consideration, begins in the transparent tissue, but is complete only in the portion below the joint.

Hybrid, or not? In the March (1891) number of the BULLETIN, I called attention to the sterility of the achenia of *Solidago serotina*. Ait., var. *gigantea*, Gray, and mentioned that "this, taken with the place of growth and the intermediate character, would be evidence enough, at least, to suggest" that the plant is a hybrid. This judgment was based upon the principles governing the determination of a wild hybrid, as set forth in Bentham's "Handbook of the British Flora," P. L. I wish to add that a careful examination of the plants of this kind in the stations of our Flora has failed to show one filled seed. W. W. ROWLEE.

New Localities for Rare Plants. Hibiscus grandiflorus, Mx. —This well-marked species grows abundantly in an open swamp near White Hall, Greene County, Ill. This station is 70 miles north of St. Louis, and I believe the farthest north it has been recorded.

Though closely allied to the showier *H. Moscheutos*, it is readily distinguishable by the velvety pubescenee clothing the entire plant, cordate leaves and hirsute pods.

Veratrum Woodii, Robbins. At numerous times in the past few years, in the months of July and August, I have seen specimens of *Veratrum* growing on a brushy hillside near Upper Alton, Madison County, Ill. I only caught fleeting glimpses of it from a passing train, but so conspicuous a plant is *Veratrum* that it was easily recognizable as a member of the genus.

I have this season had an opportunity to examine specimens and find as I expected, that it was *V. Woodii*. It is a well-marked species, easily distinguishable from *V. viride*.

Some of the specimens were 5 feet in height, the huge panicle over 2 feet in length.

In Patterson's catalogue but one locality is given for this plant, namely, Hancock County, collected by Mead. Will likely be found in other localities in the southern part of the State, where it should be expected.

I have specimens collected near St. Louis, Mo., by Letterman. FRANK E. MCDONALD.

Reviews of Foreign Literature.

The Lichen Genus Cladonia. The above is the subject of an extremely interesting paper, published in the spring of 1891, by G. Krabbe, of the Univ. of Berlin.

The investigations for this work were begun in 1880, therefore covering a period of ten years. The work is very complete and exhaustive; studies in the field and laboratory combine to make the whole a thorough history of the development story of this genus. It was undertaken, the author says, in reference to three special features. First, the significance of the upright portion of the thallus or podetium; second the peculiar morphological significance of the polymorphism exhibited by this organ; third the question of sexuality which he claims can be studied here with more certainty than in other genera, because the development of the apothecia can be more easily traced here. In regard to the morphology of the podetium, there is a difference of opinion among lichenologists, some claiming it is the upright portion of the thallus, others that it is itself the thallus, and that the horizontal portion which precedes its formation in an organ corresponding to the protonema of the moss. Krabbe differs from both these views, and considers the podetium the homologue of the fruit body of the ascomycetes. In this way is found another argument for the double nature of the lichen, though this is now so generally recognized, that throughout the article the regular fungus forms are spoken of as the ascomycetes without algæ and the lichens, as ascomycetes with algæ.

The hyphæ forming the podetium rise from the gonidial layer of the thallus, branches grow from the latter upright or at right angles in little tufts, till they break through the rind. These he calls fruit primordials, and they often carry up with them in their growth some of the gonidia of the layer from which they started. Before the primordials have broken through the surface, the ascus bearing hyphæ may arise. It is not possible in all cases to distinguish exactly where a cell ceases to be an ordinary hypha and becomes an ascus. Certain cells increase in diameter, and as one follows them upward, they are seen to end in ascus cells or asci. In some cases it was certain that these ascus branches originated from the primordial or sterile branches.

He divides the whole genus in two classes, according to the relative time of the differentiation of the fruit hyphæ from the sterile ones, or perhaps more correctly, the time of the origin of the fruit hyphæ. When they originate early in the life of the fruit body, then the latter is inclined to remain more or less simple in form, so in this class are placed all having simply formed podetia. In the second class are all the cup, funnel, and variously branching forms. It is in this latter class that the polymorphism before referred to reaches its highest development. The podetium, he claims, has the same morphological significance as the fruit-body of the ordinary fungus. In the latter group of plants this organ is so uniform in shape in related species, that it is made the ground of classification. Here is the single genus *Cladonia*, it varies in shape from a small conical projection, through a series of different forms till it reaches a structure like that of a well branched tree. The causes of this branching are very carefully traced, so far as they may be considered of purely mechanical origin, such as unequal tensions coming from various causes. In connection with this comes what is termed various grades of sterility of the fruit-body. Of course, this expression can only be used on the assumption that the podetium is a fruit-body and not a thallus. It is well known that many of these bodies produce no spores, and in reference to this the author says, all grades of sterility may be found, from the extreme, where there is no differentiation of sterile and fertile threads, that is where the fruit primordials compose the whole podetium, from this extreme up to that where

large and well developed asci are formed, but which fail to produce any spores.

The next and possibly most important question discussed is that of sexuality. It may be noticed here in passing, that without question, the belief that this feature occurs in any class of lichens, and in fact, in any of the higher fungi, is slowly losing ground. The adherents of this theory have been obliged to retreat from group to group, till they reached the Florideæ, or red sea-algæ, where the proofs of sex are still considered conclusive.

Krabbe says there is no possibility of sexuality in the genus *Cladonia*, that is to say, no possibility of fertilization accomplished in any manner with which we are acquainted. The only indication which might in any way imply such an act, he describes as follows: In some instances the ascus-hyphæ, when fully grown and swollen out, forming large cells, apparently for the development of spores within, lose their character as ascus-hyphæ, and turn back to sterile ones. This is brought about by the apical portion of the cell changing its manner of growth, becoming smaller in diameter, and stretching up until it somewhat resembles a trichogyn, and the enlarged part at the base resembles an ascogon. Now he says of this, the resemblance to the real ascogon and trichogyn of the Florideæ is very slight, and there are always two points of difference, these are the thread or tubular cell resembling the trichogyn, may branch, and it always starts gradually from that part which rasembles the ascogon. In both respects this is unlike the development of the true ascogon. It is hardly possible for those accustomed to the teachings of the text-books on general botany, and to the plates with the forked trichogyn of the Collemaceæ, taken from Stahl's work, to pass over this so lightly. The question will recur, what end is to be served by such a change of an organ.

The explanation of a certain element of the podetium forms a very striking feature of this most interesting article; that is, the presence of large numbers of soredia about the outer circumference of the podetia. The older writers on lichens regard these soredia as formed on this organ in the ordinary way by which this means of vegetative reproduction is accomplished. In short

they consider it an argument in favor of the thallus nature of the podetium. In his description of them, the author says on the periphery of the fruit body there is often an entire mantle of these gonidia with their hyphæ threads, in other cases they are in little heaps. By following the development of these lichens it is seen that there is no possibility of these gonidia having originated from those in the thallus. This being admitted, there are only two other hypotheses possible. Either they must be the direct product of the hyphœ threads cut off by abstriction, or they must be foreign bodies which have found their way there from outside, and have clung there till the hyphæ on the outer part of the lichens have woven them in. The former hypothesis is untenable on the grounds that such a formation has never been observed, and this forms a strong argument for the fungus-alga theory of the lichen. If the gonidia were a direct outgrowth of the hyphæ threads they must have been found in the process of development. This leaves only one explanation, namely, that they are foreign bodies which have been borne to the podetium through the air. The author says there are many other indications of such an origin, and then discusses the question whether these little bodies come to the lichen already clothed with their hyphæ filaments, that is, as complete full grown soredia, or simply as naked algæ cells which afterward receive their covering from the lichen. He decides in favor of the former supposition, as only in two cases were naked algæ cells found on the lichen, and it was difficult to determine their fate. It was found that the outside surface of the podetium was loose in texture and thickly beset with little hooks curving over so that on the arrival of the soredia they were taken hold of and held fast, while the hyphæ threads from both soredia and podetium surface twine and interlace till complete union is formed. The philosophy of this curious arrangement is very evident. The podetium in its development grows by apical and intercalary growth in such a manner as to be unable to carry up the little providers of carbohydrates from the thallus below. So this lack is supplied from without apparently, in a purely accidental manner. There is, however, no more indications of accident than in many other instances, as, for example, pollination by wind-carried pollen grains.

To those who still doubt the compound nature of the lichen thallus this explanation of the origin and function of the outer gonidia of the podetium must seem extremely doubtful. For in this case not only is there a symbiosis between fungus and alga, according to the generally received notion of symbiosis, namely, where the parasite which is unable to get its own living lays hold of a host of suitable nature to supply its needs, and unites itself so closely to it as to become an integral part of it, but a second union occurs. Later on in the life of the plant, the fungus hyphæ, following their own manner of development, governed possibly by tendencies inherited from ancestors to whom the algæ were not a necessity, develop into an organ by such a manner of growth that it is impossible for them to carry with them their little supporters. This organ has an important function, that of furnishing spores to provide for the continuance of the species. Nature, ever ready with resources, now provides the little algæ from without, which in their turn seek out the plant requiring assistance, unite themselves to it, and "live forever afterward in peace and harmony." After all, this is no more wonderful than other processes which are held as well authenticated facts.

E. L. G.

Fontinalacees—Monographie des. J. Cardot. (Mem. Soc. Sci. Cherbourg, xxviii. 152 pages, 1892).

This work makes an epoch in the history of mosses, as the author claims for it the honor of being only the third monograph of a family of Bryophyta. Every type but one has been seen, and all the larger collections and exsiccatæ have been examined. The result is very satisfactory. Six genera are recognized, of which three, *Fontinalis*, *Brachelyma* and *Dichelyma*, are North American. Thirty-three species of *Fontinalis* with twenty-one in North America, adds ten to the number included in Lesquereux and James' Manual. The species are ranked in four grades, according to their importance—*F. antipyretica*, *F. biformis*, *F. disticha*, *F. Novæ-Angliæ*, *F. hypnoides*, *F. microdonta*, *F. dichelymoides* and *F. filiformis* taking first rank, whereas most of the new species rank third and fourth, *F. maritima*, *F. Kindbergii*, *F. Howellii*, *F. chrysophylla*, *F. Delamarei*, *F. mollis*, *F. Cardoti*, *F. involuta*, *F. tenella*, *F. Duriæi*, *F. flaccida* and *F. Langloisii*

being additions to our list. *Dichelyma subulatum* is changed to *Brachelyma*, and *D. Swartzii* is reduced to *Hypnum fluitans*.

E. G. B.

Enumeratio Muscorum Caucasi. V. F. Brotherus. (Acta Soc. Sci. Fenn. xix. 170 pp. quarto, 1892).

This beautiful memoir is a very important contribution to geographical Bryology, and of much interest to American students, many of the species occuring on this side of the Atlantic.

Although the author claims to follow Lindberg in the nomenclature, we notice several discrepancies, which are interesting, as being also unlike Braithwaite's accepted names—*Encalypta* for *Leersia*, *Mnium* for *Astrophyllum*, *Ulota* for *Weissia*, *Orthotrichum* for *Dorcadion* and *Amphidium* for *Anœtangium*. The descriptions of new species are by Lindberg, Brotherus, Muller and Venturi, twenty-four Acrocarpi and ten Pleurocarpi being characterized. Four hundred and twenty Musci, six *Sphagna* and thirty-four Hepaticæ are listed. E. G. B.

Index to Recent Literature Relating to American Botany.

Ægagropilen—Ueber. G. Lagerheim. (Nuova Notarisia, iii. 89-95).

Albinos among Orchids. Anna Murray Vail. (Gard. and For. v. 395).

Amarantus crassipes. John M. Holzinger. (Bot. Gaz. xvii. 254-256, one plate).

Arisæma triphyllum—On the Development of the Embryo-sac of. D. M. Mottier. (Bot. Gaz. xvii. 258-260; one plate).

Aster amethystinus. (Gard. and For. v. 377, with figure).

This illustration, it is claimed, is the first ever published of the above species.

Botanical Tramp—A Rocky Mountain. F. D. Kelsey. (Zoë, iii., 108–113).

An account of the plants observed in a botanical excursion in the vicinity of Helena, Mont.

Botrychium Virginianum—On the Apical Growth of the Stem

and the Development of the Sporangium of. C. L. Holtzman. (Bot. Gaz. xvii. 214-217; one plate).

Check List of the Plants of Kansas. Bernard M. Smyth. (8vo. pp. 34, Topeka, 1892).

1764 species and varieties of flowering plants and 164 ferns and mosses are enumerated, and their distribution indicated.

Cochlearia Groenlandica, L. Edward S. Marshall. (Journ. Bot. xxx. 225, 226, plate 326).

Connecting Forms among Polyporoid Fungi. Lucien M. Underwood. (Zoë, iii. 91-95).

An argument in favor of uniting some of the now recognized genera of this order.

Cypress Tree—A Large. (Meehan's Month. ii. 135).

With an illustration of John Bartram's tree near Philadelphia.

Desmids from New Hampshire—New. Wm. N. Hastings. (Amer. Month. Micros. Journ. xiii. 153-155, with plate).

New species and varieties are described and figured in the genera *Euastrum*, *Xanthidium*, *Staurastrum* and *Closterium*.

Desmids—How to Collect. Wm. N. Hastings. (The Microscope xii. 147–150).

Diamtoms of the Connecticut Shore, I. W. A. Terry. (Am. Micros. Journ. xiii. 185).

Diatoms of the Florida Coast—Notes on the. C. Onderdonk. (The Microscope, xii. 78, 79).

A new species, *Actinoptychus pentagonalis*, is noted.

Dictionary of Botanical Terms. A. A. Crozier. 8vo. pp. 202. New York. Henry Holt & Co., 1892).

A complete account of the terminology of modern botany has long been a great desideratum, and the work here noticed, to the production of which Mr. Crozier has devoted a great amount of research, will be welcomed by all botanical students. It covers the whole field of botany, including special terms used in agriculture and horticulture. In the progress of the science some terms formerly in use have become obselete, and most of these are omitted, although all which have any present appli-

cation are retained. The very numerous synonyms are reached by cross references. In every case the pronunciation of the term is indicated.

The book is handsomely printed and well bound, and should find place in the libraries of all botanists. N. L. B.

Flora of Chicago and Vicinity—Notes on the. E. J. Hill. (Bot. Gaz. xvii. 246-252).

Houttynias—The. (The Garden, xlii. 111).

A note on and illustration of *Houttynia Californica*

Lindbladia—On the Genus. Geo. A. Rex. (Bot. Gaz. xvii. 201-205).

A discussion of the history and characters of this genus of Myxomycetes, with description of *L. effusa*, var. *simplex*, n. var.

Living Fossils. E. H. Barbour. (Bot. Gaz. xvii. 223).

Description of the growth of a *Chara* at Fall River, S. Dak.

Mariposa County as a Botanical District, III. J. W. Congdon. Zoë, iii. 123–131).

This installment of Mr. Congdon's paper is mainly devoted to an account of the plants of the Coniferous Belt.

Metaspermæ of the Minnesota Valley—Introduction. Conway Macmillan. (8vo. pp. 36; Minneapolis, 1892).

This is the preface to a "Flora" of the region, prepared for the Geological and Natural History Survey of the State, reprinted in advance from the main document, which will be reviewed in these columns when issued.

Michigan Flora. W. J. Beal and C. F. Wheeler. (8 vo. pp. 180; Lansing, 1892).

This is a new catalogue of Michigan Plants, Anthophyta and Pteridophyta, prepared for the Thirteenth Annual Report of the Secretary of the State Board of Agriculture. It enumerates 1746 species and varieties, indicating the habitat and distribution, and citing localities for the rarer ones. The catalogue proper is prefaced by sixty-six pages of matter dealing with the economic aspects of the Flora, its geographical distribution, bibliography, herbaria consulted, manuscript lists employed, the effect of clim-

ate and soil on distribution, timber-trees, weeds, the procession of flowers, and many other notes of importance and value.

N. L. B.

Mobile Diatom Deposits. K. M. Cunningham. (Amer. Month. Micros. Journ. xiii. 169, 170).

A list of species identified by Dr. D. B. Ward.

Monstera deliciosa. (The Garden, xlii. 99. illustrated).

Native Shrubs of California. Edward L. Greene. (Gard. and For. v. 436).

Nomenclature– A Note on. Alphonse De Candolle. (Zoë, iii. 172, 173).

Translated from the author's note in French in the May issue of the Journal of Botany.

Nomenclature of Plants. Katharine Brandegee. (Zoë, iii. 166-172).

Nomenclature—Botanical. (Gard. and For. v. 362).

Comments on the circular sent out by the Committee of German botanists appointed to amend the laws of botanical nomenclature as adopted at the Paris Conference of 1867.

North American Helicosporæ. A. P. Morgan. (Journ. Cincin. Soc. Nat. Hist. xv. 39-52; 21 figures).

Descriptions and illustrations of the North American species of the genera *Helicomyces, Helicoma, Helicoon,* new genus, *Everhartia* and *Troposporium.* A number of new species are characterized.

Notes on American Wild-Flowers. Wilfred A. Brotherton. (Am. Gard. xiii 516).

With illustrations of *Dicentra Cucullaria, Asarum Canadense Liparis liliifolia, Mitella diphylla* and *Smilacina racemosa.*

Notes on the Flora of Smythe County, Virginia. Anna Murray Vail. (Gard. and For. v. pp. 364, 375, 388, 424, 437).

Notes on Exotic Fungi in the Royal Herbarium, Kew. Geo. Massee. (Grevillea, xxi. 1-6).

Geaster involutus from St. Domingo, *Diatrype artocreas* from St. Vincent and *Dendrographium atrum* from the Amazon Valley.

are American species described as new, the latter a new genus.

Our Native Orchids. Francis Wilson. (Am. Gard. xiii. 518).

With illustrations of *Goodyera pubescens* and *Corallorhiza multiflora.*

Phyllosiphon, Kuhn—Neue Arten der Gattung. G. Lagerheim. (Nuova Notarisia, iii. 120-124).

Descriptions and illustrations of three new species from Ecuador.

Pink and Yellow Pond Lilies. W. W. Bailey. (Bot. Gaz. xvii. 229).

Record of a pale-yellow form of *Castalia odorata* from Cape Cod, where the pink form is abundant. Prof. Bailey notes also, the occurrence of *Lotus corniculatus* at Providence.

Recent Work in Systematic Hepaticology. L. M. Underwood. (Bot. Gaz. xvii. 218 220).

Relation of Certain Fall to Spring Blossoming Plants.—II. A. F. Foerste. (Bot. Gaz. xvii. 223-245).

Rhus—Notes on the Genus. T. J. W. Burgess. (Journ. and Proc. Hamilton Assoc. 1891-92, 119-130).

Root-Pressure—An Apparatus for Determining the Periodicity of. M. B. Thomas. (Bot. Gaz. xvii. 212-214; one plate).

Salicornia mucronata. (Meehan's Month. ii. 129; with colored plate).

The author of this note points out the erroneous use of the common name "Samphire" for *S. mucronata*, the true Samphire being an umbelliferous plant, *Crithmum maritimum*, extensively used on the English coast for pickles. *Salicornia herbacea*, the species common on European shores, especially along the Mediterranean, where during the last generation large quantities of it were dried and burned for its ashes, which then were used in the manufacture of glass and soap, was known as "Glass-wort," a name which is also used for the American species.

Sequoia gigantea—Discovery of a New Grove of. Wm. W. Price. (Zoë, iii. 132, 133).

Note on a group of six trees in Placer Co., Cal., believed to be the most northern known.

Shark River Diatoms. Albert Mann, Jr. (Sea Side Torch, iv. 143).

Smilax glauca. (Gard. and For. v. 424, with illustration).

Some Attractive Native Plants. L. H. Bailey. Am. Gard. xiii. 513).

Illustrations are given of *Cypripedium pubescens, C. acaule, C. parviflorum* and *Habenaria fimbriata.*

Some Results of a Year's Work. Arthur C. Waghorne. (Evening Herald, St. John's, New Foundland, June 15, 1892.)

Mr. Waghorne gives an interesting summary of the number of species of plants collected by him in Labrador and New Foundland, and makes especial reference to *Capsella divaricata*, found on the beach at Couche, stating that it has hitherto been found at but one place in North America, namely, the interior of British Columbia. But in this he is in error, for it was collected by Mr. J. A. Allen in 1882, on the seashore of the Dead Islands, Labrador, and is of very wide distribution on the Pacific Coast (see BULLETIN xvii. 311). N. L. B.

Strawberry Leaf—Interesting Variations of the. Mrs. W. A. Kellerman. (Bot. Gaz. xvii. 257. 258, illustrated).

Sugar Maple in Ohio.—A. (Gard. and For. v. 380, a full page illustration.)

Tendrils of Passiflora cœrulea. D. T. MacDougal. (Bot. Gaz. xvii. 205-212, one plate.

The Plea of Expediency. N. L. Britton. (Bot. Gaz. xvii. 252-254).

Variations and Intermediate Forms of Certain Asters. W. C. Warner. (Journ. Cincin. Soc. Nat. Hist. xv. 55-58).

A discussion of the *Asters* of the group Heterophylli, as they occur in Ohio.

Western Shad-Bush—The. (Gard. and For. v. 409).

Notes on the geographical distribution of *Amelanchier alnifolia*, with the reproduction of a photograph of the tree as it appears in Washington.

Your Weeds and Your Neighbor's. C. F. Millspaugh. (Bull. W. Va. Agric. Exper. Sta.)

Dr. Millspaugh, as botanist of the West Virginia Experiment Station, has made a thorough study of the weeds of his State, the results of which have appeared in a series of bulletins under the above title. Part II deals with the distribution of weeds, their bad points, uses for fodder, and chemical weed exterminators. Part III is a descriptive list of the weeds of West Virginia grouped in their natural orders. An even two hundred are enumerated, which are classified as follows:

	1st Class. Worst.	2d Class. Bad.	3d Class. Indifferent.	Total.
Perennial,	42	45	38	125
Biennial,	13	6	1	20
Annual,	27	17	11	55
Total,	82	68	50	200

With many of the worst species a small engraving is given, showing the plant or a portion of it, and usually a characteristic part more magnified.

A list of the diseases for which the weeds—referred to by number—are used is given. There is likewise an extended list of the common names of weeds.

The farmers and the crop growers of West Virginia are fortunate in having such a thorough work upon their weeds placed within easy reach of all. B. D. H.

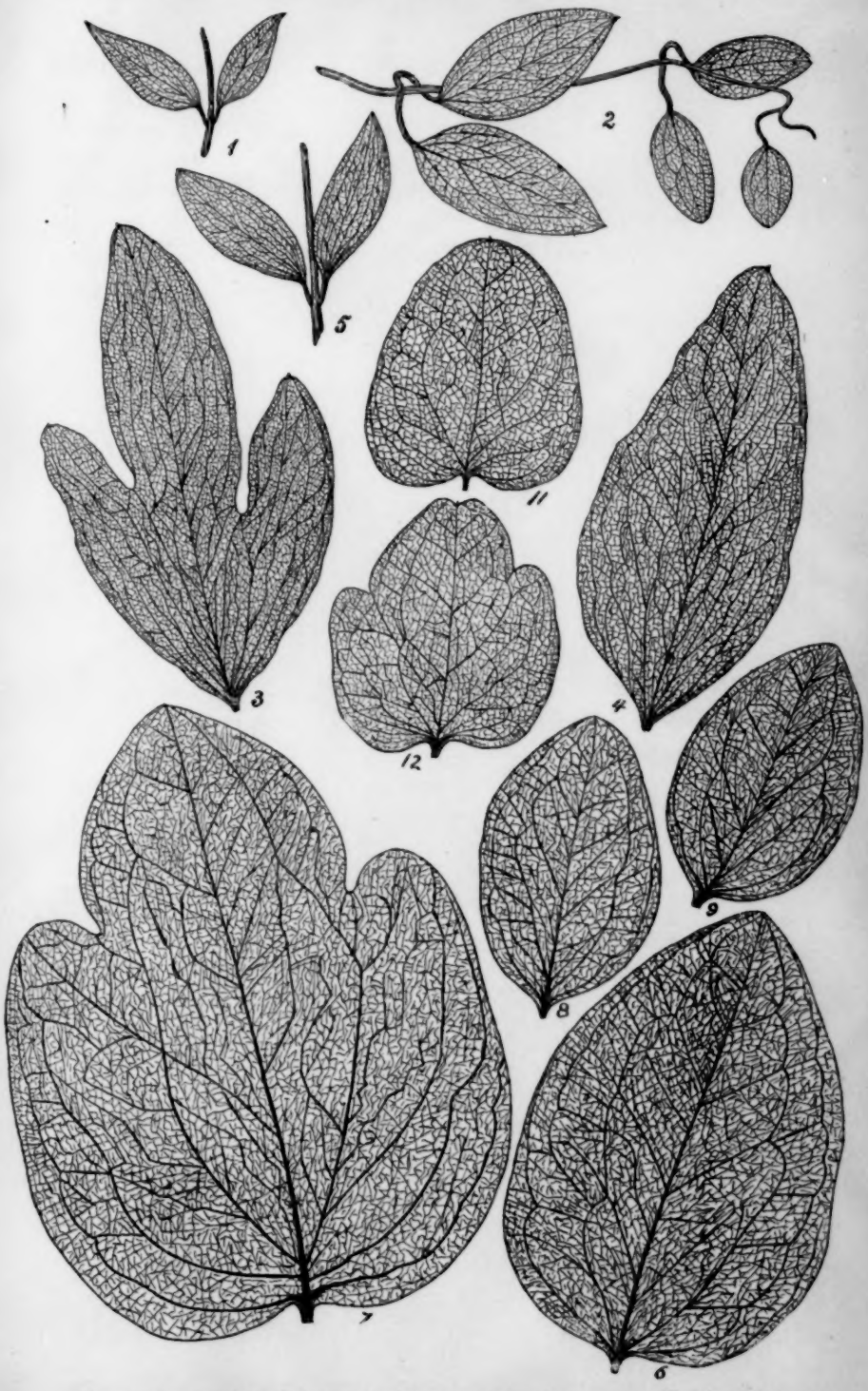
Yucca pollination. H. J. Webber. (Am. Nat. xxvi. 774).

Zygopetalum crinitum. A. H. (The Garden, xlii. 140).

A colored plate of the above species and notes on *Z. Burkei*, *Z. brachypetalum*, *Z. Mackayi*, *Z. maxillare*, and *Z. rostratum*.

Zygopetalum graminifolium. R. A. Rolfe. (Gardn. Chron. xii. 179).

The description of a new species from South Brazil.



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